

What is Claimed is:

1. A method for manufacturing tantalum carbide, comprising the steps of:
placing tantalum or a tantalum alloy in a vacuum heat treatment furnace;
heat-treating the tantalum or tantalum alloy under a condition where a native
oxide layer of Ta_2O_5 formed on a surface of the tantalum or tantalum alloy is
sublimated to remove the Ta_2O_5 ; and heat-treating the tantalum or tantalum
alloy by introducing a carbon source into the vacuum heat treatment furnace to
form the tantalum carbide from the surface of the tantalum or tantalum alloy.

2. The method for manufacturing the tantalum carbide according to claim
1, wherein

the tantalum carbide is TaC formed by penetration of carbon into all
areas of the tantalum or tantalum alloy.

3. The method for manufacturing the tantalum carbide according to claim
1, wherein

the tantalum carbide is formed by penetration of carbon into some
areas of the tantalum or tantalum alloy, and the tantalum carbide has a
laminated structure where Ta_2C and TaC are laminated in this order on the
surface of the tantalum or tantalum alloy.

4. The method for manufacturing the tantalum carbide according to claim
1, wherein

the method is a heat treatment method for measuring change of an
emissivity when the native oxide layer is removed using a pyrometer.

5. The method for manufacturing the tantalum carbide according to claim

1, wherein

a thickness of the tantalum carbide capable of being formed is controlled by adjusting temperature, time and pressure conditions for introducing the carbon source into the vacuum heat treatment furnace and heat-treating the tantalum or tantalum alloy processed into an optional shape.

6. The method for manufacturing the tantalum carbide according to claim 1, wherein

the heat treatment condition under a condition where the native oxide layer of Ta_2O_5 is sublimated is at a temperature in a range from approximately 1750°C to 2000°C and a pressure of approximately 1Pa or lower.

7. The method for manufacturing the tantalum carbide according to claim 1, wherein

the heat treatment condition for introducing the carbon source into the vacuum heat treatment furnace to form the tantalum carbide on the surface of the tantalum or tantalum alloy is a temperature from 1860°C to 2500°C, and a pressure of 1Pa or lower.

8. Tantalum carbide obtained by placing tantalum or a tantalum alloy in a vacuum heat treatment furnace; heat-treating the tantalum or tantalum alloy under a condition where a native oxide layer of Ta_2O_5 formed on a surface of the tantalum or tantalum alloy is sublimated to remove the Ta_2O_5 ; heat-treating the tantalum or tantalum alloy by introducing a carbon source into the vacuum heat treatment furnace to make carbide penetrate from the surface of the tantalum or tantalum alloy.

9. The tantalum carbide according to claim 8, wherein
the tantalum carbide is TaC formed by the penetration of carbon into all
areas of the tantalum or tantalum alloy.

10. The tantalum carbide according to claim 8, wherein

5 the tantalum carbide is formed by the penetration of carbon into some
areas of the tantalum or tantalum alloy, and the tantalum carbide has a
laminated structure where Ta₂C and TaC are laminated in this order on the
surface of the tantalum or tantalum alloy.

11. A wiring of tantalum carbide formed by patterning tantalum or a
10 tantalum alloy into a prescribed shape on a semiconductor substrate,
heat-treating the tantalum or tantalum alloy under a condition where a native
oxide layer of Ta₂O₅ formed on a surface of the patterned tantalum or
patterned tantalum alloy is sublimated, removing the Ta₂O₅ from the surface of
the patterned tantalum or patterned tantalum alloy, heat-treating the tantalum
15 or tantalum alloy by introducing a carbon source, and penetrating carbon from
the surface of the patterned tantalum or patterned tantalum alloy.

12. The wiring of the tantalum carbide according to claim 11, wherein

the wiring of the tantalum carbide is TaC formed by the penetration of
carbon into all areas of the patterned tantalum or patterned tantalum alloy.

20 13. An electrode of tantalum carbide having a prescribed shape formed by
processing tantalum or a tantalum alloy into a prescribed shape, heat-treating
the tantalum or tantalum alloy under a condition where a native oxide layer of
Ta₂O₅ formed on the surface of the processed tantalum or processed tantalum

alloy is sublimated, removing the Ta_2O_5 from the surface of the processed tantalum or processed tantalum alloy, heat-treating the tantalum or tantalum alloy by introducing a carbon source, and penetrating carbon from the surface of the tantalum or tantalum alloy.

5 14. The electrode of tantalum carbide according to claim 13, wherein
the electrode of tantalum carbide is TaC formed by the penetration of
carbon into all areas of the tantalum or tantalum alloy processed into a
prescribed shape.

10 15. The electrode of tantalum carbide according to claim 13, wherein
the electrode of tantalum carbide is a filament of the tantalum carbide
or a heater of the tantalum carbide.